

REMARKS

Claims 1-¹³~~23~~ were pending and under consideration.

In the Office Action of February 13, 2003, the specification was objected to claims 5 and 9 were objected to, and claims 1-4, 6-12 were rejected. It is noted with appreciation that claim 5 would be allowed if rewritten.

NO In response, the disclosure, claims 1, 6, and 9 have been amended. Claim 4 is cancelled. Claim 5 has been rewritten in independent form. Claim 13 is added as a new dependent claim.

A. Objection to Specification and Claim 9

✓ As noted by the Examiner, Applicants have amended the disclosure and claim 9 to reflect the correct spelling of "gamma-butyrolactone". Accordingly, Applicants respectfully request withdrawal of these objections.

B. §112, Second Paragraph Rejection

Claims 4 and 6 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

NO Claim 4 has been cancelled thereby rendering the rejection moot. As suggested by the Examiner, claim 6 has been amended to recite "an electrolyte in a gelated state. Accordingly, Applicants respectfully request withdrawal of these objections.

C. §102(b) Rejection

Claims 1, 4, 6, 8, 9, 11 and 12 are rejected under 35 U.S.C. §102(b) as being anticipated by Takeda et al. (U.S. Patent No.: 5,658,687). Applicants respectfully traverse this rejection.

Claim 1 has been amended to claim a solid electrolyte cell comprising a diene compound contained in at least one of the positive electrode, negative electrode and the solid

electrolyte, and being in a range of 0.0001 mol to 0.0005 mol per one gram of the positive electrode active material. This is clearly unlike Takeda et al., which fails to disclose or even suggest the range of the diene compound in the present invention.

While Takeda et al. teaches that cyclodiene, cyclopentadiene and 1,3-cyclohexadiene are added in a amount of 2-5wt% as a binder in the positive electrode (col. 15, line 24), the amount of a diene compound in the present invention is much less, being 0.14 to 0.71 wt% when an amount of 0.0001 mol to 0.0005 mol per one gram of the positive electrode is used. Further, cyclodiene, cyclopentadiene and 1, 3-cyclohexadiene are generally not used as a binder because at room temperature, they will be in liquid form.

Thus, unlike Applicants' claim 1, Takeda et al. fails to disclose or even suggest a range of 0.14 to 0.71 wt% of 1, 3-cyclohexadiene (80) and LiCoO₂ (98). When the range of diene compound is less than 0.14 wt%, the efficiency of suppressing oxidative deterioration of the electrolyte component decreases. When the range of diene compound is greater than 0.71 wt%, as it is in Takeda et al., there is a risk that the diene compounds undergo a polymerization reaction or that a gas is produced. This is evident in the unexpected results of the present invention.

In samples 1 and 2, the diene compound ratio was set in the range of 0.0001 mol to 0.00005 mol. Sample 6, on the other hand, contained 0.00188 mol of 1, 4-cyclohexadiene to 1g of the positive electrode active material. After 300 charging/discharging cycles, samples 1 and 2, with superior volume upkeep ratio, were free from gas evolution accompanying the charging/discharging cycles. In sample 6 gas was produced with the progress of charging/discharging cycles; thus affecting the cell appearance. From this, it could be seen that the content of the diene compound per 1g of the positive electrode is preferably in a range from 0.0001 mol to 0.00005 mol.

Accordingly, Applicants' invention is not anticipated under 35 U.S.C. §102(b) over Takeda et al. Applicants respectfully submit this rejection has been overcome and request that it be withdrawn.

Claims 6, 8, 9, 11 and 12 all depend directly or indirectly from claim 1 and are therefore allowable for at least the same reason that claim 1 is allowable.

D. §103(a) Rejection

Claims 1-4, 6-10, and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Juichi et al. (JP 09-035746) in view of Linden, Handbook of Batteries (pgs 36.1-36.3; 36.13-36.16). Applicants respectfully traverse this rejection.

Claim 1 has been amended to claim a solid electrolyte cell comprising a diene compound contained in at least one of the positive electrode, negative electrode and the solid electrolyte, and being in an range of 0.0001 mol to 0.0005 mol per one gram of the positive electrode active material. This is clearly unlike Juichi et al. or Linden, which fails to disclose or even suggest the amount of the diene compound in the present invention.

While Juichi et al. teaches that diene compounds in the range of 0.0001 to 5.0 mol/l or 0.005 to 2.0 mol/l (equivalent of 10-20 vol%) (0009) and Linden teaches the diene compounds to be in the range of 33 vol% to 75 vol% (Table 36.9), the amount of a diene compound is much less than that of the present invention of 75 vol%. Further, Juichi et al. actually teaches that an additive in the positive electrode should not decompose (0007); whereas the present invention claims that diene compound should decompose in order to accept an active oxygen from a positive electrode (page 8).

Thus, unlike Applicants' claim 1, Juichi et al. and Linden fail to disclose or even suggest a range of 0.14 to 0.71 wt% of 1, 3-cyclohexadiene (80) and LiCoO₂ (98) and that diene compound should decompose in order to accept an active oxygen from a positive electrode. When the range of diene compound is less than 0.14 wt%, as it is in Juichi et al.

and Linden, the efficiency of suppressing oxidative deterioration of the electrolyte component decreases.

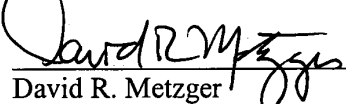
Accordingly, it would not have been obvious to one skilled in the art at the time when the invention was made to combine the references as suggested by the Examiner to derive what is recited in claim 1. Applicants respectfully submit this rejection has been overcome and request that it be withdrawn.

Claims 2-3, 6-10, and 12 all depend directly or indirectly from claim 1 and are therefore allowable for at least the same reason that claim 1 is allowable.

In view of the foregoing, it is submitted that the pending claims 1-3, 5-13 are patentable over the references cited by the Examiner. Further, all of the Examiner's objections and rejections have been addressed herein. It is, therefore, submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

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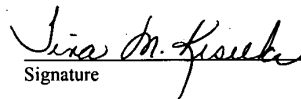
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